due to the high tides. No loss of life is reported, and vessels coming in later, while damaged to some extent as to rigging and sail, rode safely through the storm:

The captain of the steamship *Espana* reports that he first encountered the storm in the Gulf Monday, August 12, at 2:30 p. m., with wind 20 to 30 miles, which gradually increased through Tuesday and Wednesday, until a maximum was reached Thursday between 2 and 7 p. m., the barometer falling steadily all the while. The wind was estimated to be between 60 and 70 miles an hour from the southeast. The Gulf was very rough, and waves broke over the funnels. Between the hours of 2 and 7 p. m., Thursday, there was so much spray that it was impossible to see where the boat was going. The captain and the entire crew had remained on watch for three days and nights, and were in an exhausted condition when they reached port Friday morning.

The secretary of the Chamber of Commerce informed me that the amount saved by the warnings could not be estimated, but would aggregate several millions of dollars.

Aside from advices issued in connection with the middle Gulf coast storm, no special forecasts or warnings were required in the United States; neither were hurricane warnings ordered, nor were they needed, in the West Indies.

The forecast center for the west Gulf district was closed at Galveston, Tex., August 5, and opened at New Orleans, La., August 8, 1901.

AREAS OF HIGH AND LOW PRESSURE.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocities.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long. W.	Length.	Duration.	Daily.	Hourly.
High areas.		°	°		°	°	*Miles.*	*Days.*	*Miles.*	*Miles.*
I	1, a. m.	50	120	6, p. m.	46	60	3,300	5.5	600	25.0
II	6, a. m.	51	114	9, p. m.	41	70	2,425	3.5	693	28.9
III	9, p. m.	49	104	13, a. m.	48	53	2,750	3.5	786	32.7
	11, p. m.	45	67				825	1.5	550	22.9
IV	13, a. m.	53	121	19, p. m.	46	60	3,625	6.5	558	23.2
V	17, a. m.	53	121	22, p. m.	46	60	3,025	5.5	550	22.9
VI	22, p. m.	54	114	26, a. m.	42	76	2,300	3.5	657	27.3
VII	25, a. m.	50	100	28, p. m.	46	60	2,150	3.5	614	25.6
VIII	28, a. m.	51	114	31, p. m.	49	86	1,425	3.5	407	17.0
Sums							21,825	36.5	5,415	225.5
Mean of 9 paths							2,425		602	25.1
Mean of 36.5 days									598	24.9
Low areas.										
I	1, a. m.	44	104	3, a. m.	48	68	2,000	2 0	1,000	41.7
II	4, p. m.	51	114	7, a. m.	48	90	1,625	2.5	650	27.1
III	4, p. m.	32	100	7, p. m.	48	68	2,375	3.0	791	33.0
IV	7, a m.	44	116	11, a. m.	45	64	2,700	4.0	675	28.2
V	9, a. m.	21	78	19, p. m.	42	83	2,275	10.5	217	9.0
VI	21, p. m.	35	98	24, a. m.	48	68	1,825	2.5	730	30.4
Sums							12,800	24.5	4,063	169.4
Mean of 6 paths							2,133		677	28.2
Mean of 24.5 days									522	21.8

For graphic presentation of these highs and lows see Charts I and II.—*Geo. E. Hunt, Chief Clerk Forecast Division.*

RIVERS AND FLOODS, AUGUST, 1901.

The Mississippi River mean stage was about 3.5 feet lower than during July, 1901, with the greatest fall below the mouth of the Ohio River. The fall was steady throughout the month above Cairo, Ill., but below that place it was interrupted about the middle of the month by heavy rains and for ten days thereafter there was a steady rise, the maximum stages occurring between the 27th and 31st. The maximum stage of 11.4 feet at New Orleans, La., on the 15th, however, was due neither to the rain nor to the rise from the upper river, but to backwater from the high Gulf tide that occurred during the tropical storm in progress at that time.

The Missouri and Ohio rivers presented nothing of special interest, and both were somewhat lower than during the preceding month.

In the Tennessee, Cumberland, and the rivers of the South Atlantic States, conditions were widely different, the heavy rains of the middle of the month causing flood stages generally, except along the Cumberland where the danger lines were hardly reached. In the Tennessee, danger line stages were general from Chattanooga to the mouth of the river. The following report on the general conditions of the Tennessee River for the month, from the head waters to Bridgeport, Ala., was prepared by Mr. L. M. Pindell, official in charge of the United States Weather Bureau office at Chattanooga, Tenn.

The month opened with the river below the safe navigable stage for large boats and with a continuation of the drought which had prevailed since June 8. On the 5th, light rain was reported over the river system with a slight rise at Clinton, Tenn., and a storm center over the lower Mississippi Valley which moved northeastward to north Georgia, producing heavy rains in front of its center ranging from 0.91 inch at Kingston, Tenn., to 3.24 inches at Rogersville, Tenn. The storm then moved northward along the Atlantic coast with heavy rain over the extreme headwaters. The French Broad and Holston rivers rose rapidly, producing a 10-foot rise at Knoxville, Tenn., by the morning of the 7th and opening navigation at Chattanooga, Tenn. The river then rose to 12.2 feet by 8 a. m. of the 9th and afterwards fell slowly. Light drift was general on the 8th, 9th, and 10th. Rain began on the 10th and continued on the 11th and 12th, but was not very heavy except at Riverton, Ala., where 1.68 inches fell in twenty-four hours ending 8 a. m. of the 11th. On the 13th heavy rain was reported over the Tennessee Valley, the headwaters, and in North Carolina, and continued on the 14th and 15th over the same sections, extending also into South Carolina, Georgia, and Virginia. This heavy rain very probably resulted from the influence of the storm which was centered over the Gulf and which moved northward, east of the Mississippi River from the 14th to 17th, accompanied by heavy rains. The tributaries rose rapidly after the 13th, and on the 15th a rise of 13 feet was reported at Clinton, with the river 1.7 feet above the danger line, 10.5 feet at Kingston, 6.5 feet at Knoxville, and 7.5 feet at Chattanooga. Clinton had a rise of 20.9 feet in forty-eight hours and Kingston 14 feet. On the 16th at 8 a. m. the river at Chattanooga stood at 27.3 feet, showing a rise of 13.3 feet in twenty-four hours.

All the tributaries, and the Tennessee, at Knoxville, were falling at 8 a. m of the 17th, but still rising slowly at Chattanooga. The water passed the danger line at Chattanooga at 11 a. m. and reached the crest of 33.8 feet between 11 p. m. and 12 m. The reports were all delayed on the 14th, but when received, the following flood warnings were sent to Knoxville and Kingston. To Knoxville: "Additional advices from headquarters indicate rapid rise in river, and it will reach 25 or more feet at Knoxville by Thursday noon." To Kingston: "Heavy rains over headwaters of Clinch; river will rise rapidly, reaching 20 or more feet by to-morrow night (15th); notify river interests." On the 15th when Clinton reported a 13-foot rise the following flood warning was sent to Kingston: "River at Kingston will reach 31 or 33 feet. Heavy rise and rainfall above you." On the 15th the conditions justified a prediction of from 38 to 40 feet at Chattanooga by Saturday morning, but on the afternoon of the 16th the crest was lowered to 36 feet by Saturday noon or evening. The river interests above this city had from thirty-six to forty-eight hours notice, and at and below this city from two to seven days warning. The lower river interests were kept posted by bulletins and telegrams as to the conditions and forecasts. The loss was not as heavy as anticipated owing to prompt measures taken. Considerable damage occurred on the Southern Railway near the Watauga River, also on other roads in that vicinity. The road beds were made soft by the continuous heavy rains and trains ran slow and cautiously. The river bottoms suffered the most; all crops being practically ruined. The drift was heavy from the 15th to the 17th, and consisted of live hogs, dead animals, small buildings, fences, trees, logs, etc. This rise in August was unprecedented, passes all recollection of the oldest inhabitants, and breaks all records as to tide in river and amount of rainfall. During this freshet the heaviest rainfall for the period and for twenty-four hours was at Clinton. From 8 a. m. August 10, to 8 a. m. August 18, or in eight days, the total amount of rainfall at each station in the Tennessee River system was as follows:

	Inches.
Asheville, N. C	3.61
Murphy, N. C	4.87
Bryson, N. C	6.98
Speers Ferry, Va	5.47
Tazewell, Tenn	8.07
Bluff City, Tenn	4.67
Greeneville, Tenn	4.58
Rogersville, Tenn	4.18
Clinton, Tenn	9.80